Cholera (*Vibrio cholerae*)

December 2003

Note: This chapter pertains to *Vibrio cholerae*. Other species of *Vibrio* (*e.g., V. parahaemolyticus, V. vulnificus*) are also reportable to the New Jersey Department of Health and Senior Services (see Chapter "Vibriosis").

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Cholera is an acute diarrhea illness caused by infection of the intestine with the bacterium *Vibrio cholerae.* Two serogroups, O1 and O139, are responsible for causing extensive epidemics and multi-country outbreaks of disease. *V. cholerae* other then serogroups O1 and O139 cause similar illness and infection but are not associated with large epidemics.

B. Clinical Description and Laboratory Diagnosis

Infection by O1 or O139 serogroups of *V. cholerae* can have a range of clinical presentations, from an asymptomatic infection to mild illness involving only diarrhea, to acute enteric infection and severe illness characterized by profuse watery stools, nausea, vomiting, leg cramps, severe dehydration, and shock. Left untreated, death may occur within a few hours. The case-fatality ratio in severe untreated cases may exceed 50%; with proper treatment, the ratio is <1%.

Laboratory diagnosis is based upon isolation of *V. cholerae* O1 or O139 serogroup from stool or vomitus, or demonstration of a significant rise in titer of antitoxic or vibriocidal antibodies in patient serum. For clinical purposes a quick presumptive diagnosis can be made by visualization of moving vibrios inhibited by serotype-specific antiserum.

C. Reservoirs

Humans are the primary reservoir although environmental reservoirs exist in coastal or estuarine waters (ocean bays) that have been contaminated by sewage containing *V. cholerae.*

D. Modes of Transmission

V. cholerae is usually transmitted via the ingestion of food or water contaminated (directly or indirectly) by feces or vomitus of infected persons (*e.g.,* via sewage) or by ingestion of raw or undercooked seafood harvested from polluted waters.

E. Incubation Period

The incubation period ranges from a few hours to 5 days, usually 2 to 3 days.

F. Period of Communicability or Infectious Period

Although direct person-to-person spread has not been demonstrated, cholera is presumably transmitted as long as stools test positive for the bacterium, usually only a few days after recovery. Occasionally, the carrier state or shedding of bacteria may persist for several months. Antibiotics effective against the infecting strains shorten the period of communicability.

F. Epidemiology

Since the early 19th century, pandemic cholera has appeared in various parts of the world. During the late 20th century, as recent as 1991, epidemics reported included one that began along the Pacific coast of Peru, quickly spread to other neighboring countries and by 1994 resulted in approximately one million cholera cases in the region of Latin America. Another explosive epidemic reported in 1994 to the World Health Organization

occurred in Zaire and resulted in approximately 70,000 cases and 12,000 deaths over the course of little more than one month. In the United States, most cases generally occur in persons with recent travel to endemic areas. Other sporadic cases have been associated with ingestion of raw or incompletely cooked seafood. However, indigenous infections and at least one outbreak have occurred in Texas and the Gulf Coast of Louisiana.

People with low gastric acidity and persons with blood group "O" are at increased risk for cholera infection. Studies show that some protection against biotypes (strains) within a serogroup is conferred from previous infection. However, no protection results from infection with O1 strains against O139 infection and vice versa.

G. Bioterrorist Potential

V. cholerae O1 and O139 are considered potential bioterrorist agents. If used as a bioterroristic agent, *V. cholerae* O1 and O139 could cause a serious public health challenge in terms of ability to limit the numbers of casualties and to control other repercussions from such an attack.

2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

A. New Jersey Department of Health and Senior Services (NJDHSS) Case Definition

CASE CLASSIFICATION

A. **CONFIRMED**

- Isolation of toxigenic (cholera toxin-producing) *Vibrio cholerae* from stool or vomitus; **OR**
- A 4-fold rise in vibriocidal antibody titers between acute and early convalescent serum samples or a 4-fold decline in vibriocidal titers between early and late convalescent (more than a 2-month interval) serum samples.

B. **PROBABLE**

A clinically compatible case that is epidemiologically linked to a confirmed case by the NJDHSS.

C. **POSSIBLE**

Not used.

B. Laboratory Testing Services Available

The Public Health and Environmental Laboratories (PHEL) will test stool specimens for the presence of *V. cholerae* and confirm isolates submitted from other laboratories. Biotyping and serotyping of confirmed isolates is included in the confirmation of this organism. The mailing address is:

NJDHSS
Division of Public Health and Environmental Laboratories
Specimen Receiving and Records
P.O. Box 361, John Fitch Plaza
Trenton, NJ 08625-0361.

After authorization from the Division of Epidemiology, Occupational and Environmental Health Services, PHEL will test implicated food or water from a cluster or outbreak.

3) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify transmission sources of public health concern (*e.g.*, contaminated water or a contaminated lot of shellfish) and to stop transmission from such sources.
- To identify whether a case may be a source of infection for other persons, and if so, plan control measures accordingly.
- To identify cases and clusters of human illness that may be associated with a bioterrorist event.

B. Laboratory and Healthcare Provider Reporting Requirements

The New Jersey Administrative Code (N.J.A.C. 8:57-1.8) stipulates that health care providers and laboratories report (by telephone, confidential fax, over the Internet using the Communicable Disease Reporting System [CDRS] or in writing) all cases of cholera to the local health officer having jurisdiction over the locality in which the patient lives, or, if unknown, to the health officer in whose jurisdiction the health care provider requesting the laboratory examination is located.

Note: The New Jersey Department of Health and Senior Services requests that information about any suspect or known case of cholera that may be bioterrorist in nature, be **immediately reported** to the local health officer where diagnosed. If this is not possible, call the NJDHSS, Infectious and Zoonotic Diseases Program (IZDP) at 609.588.7500 during business hours, 609.392.2020, after business hours, on weekends and holidays. Such telephone report shall be followed up by a written or electronic report within the 24 hours of the initial report.

C. Local Department of Health Reporting and Follow-Up Responsibilities

1. **Reporting Requirements**

The New Jersey Administrative Code (N.J.A.C. 8:57-1.8) stipulates that each local health officer must report the occurrence of any case of cholera, as defined by the reporting criteria in Section 2A above. Current requirements are that cases be reported to the NJDHSS IZDP using the CDS-1 form. A report can be filed electronically over the Internet using CDRS.

2. **Case Investigation**

   a. It is the health officer's responsibility to investigate the case by interviewing the patient and others who may be able to provide pertinent information.

   b. If a bioterrorist event is suspected, the NJDHSS, in conjunction with the CDC and other response authorities, will work closely with the local health department(s) and provide instructions/information on how to proceed.

   c. Following notification of the NJDHSS, the local health officer will be asked to assist in completing the official CDC *Cholera and Other Vibrio Illness Surveillance Report* form by interviewing the patient and others who may be able to provide pertinent information. Much of the information required on the form can be obtained from the healthcare provider or the medical record. Use the following guidelines in completing the form:

      1) Accurately record the "Demographic and Isolate Information," type of cholera isolated (O1, O139, or non-O1 non-O139), source, and date of specimen. Be sure to include the patient's complete name and address at the top of the form.
      2) In the "Clinical Information" section, indicate the date of symptom onset, symptoms, and other medical information. *Note:* Regarding Question 8 (Pre-Existing Conditions) in this section, if immunodeficiency is a condition, do not indicate a patient's HIV status.

3) Complete the "Epidemiologic Information" section. When asking about exposures, follow the incubation period guidelines provided on the form (for example, "Did the patient travel in the 7 days before illness began?").
4) Complete the "Seafood Investigation" section if illness is suspected to be associated with seafood consumption. Record any restaurants, oyster bars, or food stores at which seafood was obtained by the case.
5) If it is possible that the case(s) became infected through food, use of the NJDHSS Foodborne Illness Worksheets: *Patient Food History Listing, Patient Symptoms Line Listing*, and *Food-Specific Attack Rate Table Worksheet* forms will facilitate recording additional information. It is requested that the local health officer fax the completed worksheets to the NJDHSS IZDP. This information will help link other complaints from neighboring towns, thus helping to identify foodborne illness outbreaks. **These worksheets do not replace the CDC Cholera and Other Vibrio Illness Surveillance Report form.**
6) If there have been several unsuccessful attempts to obtain patient information (*e.g.*, the patient or healthcare provider does not return calls or respond to a letter, or the patient refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as possible. Please note on the form the reason why it could not be filled out completely.
7) **If CDRS is used to report**, **enter collected information into the "Comments" section.**

d. After completing the form, attach lab report(s) and mail (in an envelope marked "Confidential") to the NJDHSS IZDP, or the report can be filed electronically over the Internet using the CDRS. The mailing address is:

New Jersey Department of Health and Senior Services.
Division of Epidemiology, Environmental and Occupational Health
Infectious and Zoonotic Diseases Program
P.O. Box 369
Trenton, NJ 08625-0369

e. Institution of disease control measures is an integral part of case investigation. It is the local health officer's responsibility to understand, and, if necessary, institute the control guidelines listed below in Section 4, "Controlling Further Spread."

4) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (N.J.A.C. 8:57-1.12)

Food handlers with cholera must be excluded from work.

Note: A case of cholera is defined by the reporting criteria in Section 2 A of this chapter.

Minimum Period of Isolation of Patient
After diarrhea has resolved, foodhandling facility employees may return to work after producing **one (1)** negative stool specimen. If the patient is treated with an antimicrobial, the stool specimen shall not be submitted until at least 48 hours after completion of the therapy. **In outbreak circumstances, a second consecutive negative stool specimen (no less than 24 hours apart) will be required prior to returning to work**.

Minimum Period of Quarantine of Contacts
Contacts with diarrhea who are foodhandlers shall be isolated and quarantined and considered in the same manner as a case (see above paragraph) and handled in the same fashion.

Note: A foodhandler is any person directly preparing or handling food. This can include a patient care or childcare provider.

B. Protection of Contacts of a Case

Persons who shared food or water with a case during their infectious period should be observed for 5 days from last exposure for signs of illness. Preventive antibiotic therapy is usually not recommended for household contacts in the United States since secondary spread is rare. Immunization of contacts is not indicated.

C. Managing Special Situations

Locally Acquired Case

A locally acquired case of cholera is an unusual occurrence as most cases occur among travelers returning from areas experiencing epidemic cholera. If you determine during the course of an investigation that a case or suspect case does not have a recent travel history to an endemic country, contact the NJDHSS IZDP at 609.588.7500, during business hours or 609.392.2020 after business hours. The Program staff can assist in instituting an investigation to determine the source of infection and mode of transmission.

Reported Incidence Is Higher than Usual/Outbreak Suspected

If an outbreak is suspected, or if multiple cases are reported among people who have not traveled out of the United States, investigate to determine the source of infection and mode of transmission. A contaminated vehicle (such as water or food) should be sought and applicable preventive or control measures should be instituted. If food is considered a suspect source of infection, use the Patient Food History Listing, Patient Symptoms Line Listing, and Food Specific Attack-Rates Table Worksheet forms, to facilitate recording additional information. Control of person-to-person transmission requires special emphasis on personal cleanliness and sanitary disposal of feces. Since person-to-person transmission is theoretically possible, special emphasis should be placed on personal cleanliness and sanitary disposal of feces. The NJDHSS IZDP staff should be consulted for determining the course of action to prevent further cases, and for the course of action required to implement disease surveillance for other cases that may cross several jurisdictions and therefore be difficult to identify at a local level.

Note: The NJDHSS Food and Drug Safety Program (FDSP) will provide policy and technical assistance with the environmental investigation. The Program can be contacted at 609.588.3123. The FDSP will coordinate the relevant follow-up with outside agencies if indicated.

Note: If a bioterrorist event is suspected, the NJDHSS and other response authorities will work closely with local health officer(s) and provide instructions/information on how to proceed.

D. Preventive Measures

Environmental Measures

Implicated food items from New Jersey or elsewhere in the United States must be removed from the environment. A decision about testing implicated food items will be made in consultation with the FDSP and the IZDP. If a commercial product is suspected, FDSP will coordinate follow-up with relevant outside agencies.

Note: The role of the FDSP is to provide policy and technical assistance with the environmental investigation such as interpreting the New Jersey Food Code, conducting a hazardous analysis and critical control point (HACCP) risk assessment, initiating enforcement actions and collecting food samples.

The general policy of the PHEL is only to test food samples implicated in suspected outbreaks, not single cases (except when botulism is suspected). The local health departments may suggest that the holders of food implicated in single case incidents locate a private laboratory that will test food, or store the food in their

freezer for a period of time in case additional reports are received. However, a single, confirmed case with leftover food consumed within the incubation period may be considered for testing.

Personal Preventive Measures/Education

To avoid exposure, recommend that individuals:

- Not eat raw or undercooked fish or shellfish. Despite good sanitation, even shellfish harvested from coastal United States waters have periodically been contaminated with *V. cholerae*.
- Always wash their hands thoroughly with soap and water before eating or preparing food, after using the toilet and after changing diapers.
- After changing diapers, wash the child's hands as well as their own.
- In a daycare setting, dispose of feces in a sanitary manner.
- When caring for someone with diarrhea, scrub their hands with plenty of soap and water after cleaning the bathroom, helping the person use the toilet, or changing diapers, soiled clothes, or soiled sheets.

International Travel

Travelers going to cholera endemic areas should pay attention to what they eat and drink. They should also consider getting vaccinated against cholera, but be warned that vaccines* are not 100% effective. Avoiding risky foods, however, will also help protect against other illnesses, including traveler's diarrhea, typhoid fever, dysentery, and hepatitis A.

Travelers should:

- "Boil it, cook it, peel it, or forget it."
- Drink only bottled or boiled water, keeping in mind that bottled carbonated water is safer than uncarbonated water.
- Ask for drinks without ice unless the ice is made from bottled or boiled water.
- Avoid popsicles and flavored ices that may have been made with contaminated water.
- Eat foods that have been thoroughly cooked and that are still hot and steaming.
- Avoid raw vegetables and fruits that cannot be peeled. Vegetables like lettuce are easily contaminated and are very hard to wash well.
- Wash hands and peel their own raw fruits or vegetables before eating.
- Avoid foods and beverages from street vendors.
- Avoid undercooked or raw fish or shellfish, including ceviche.
- Not bring any perishable food back to the United States.

For more information regarding international travel and the cholera vaccines, contact the CDC's Traveler's Health Office at (877) 394-8747 or through the Internet at <http://www.cdc.gov/travel>.

*Several vaccines are available that provide varying levels of protection against *V. cholerae*. The oral vaccines provide a high level of short-term protection against O1 strains (approximately several months). The killed whole-cell vaccine provides approximately 50% protection for up to 6 months, but does not prevent asymptomatic infection.

ADDITIONAL INFORMATION

A *Cholera Fact Sheet* can be obtained at the NJDHSS website at <http://www.state.nj.us/health>.

The CDC surveillance case definition for cholera is the same as the criteria outlined in Section 2A of this chapter. CDC case definitions are used by state health departments to maintain uniform standards for national reporting. When reporting to the NJDHSS, always refer to the criteria in Section 2A.

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